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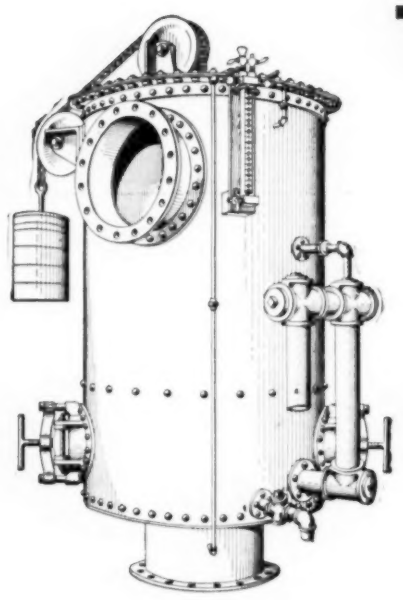

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GOOD LIGHTING GIVES PRESTIGE TO THE PRODUCT.

By H. THURSTON OWENS.

Prestige is gained by performance. We think well of men and of things that perform well. Good gas lighting gives gas a prestige which affects its sale for the 999 uses to which it has been put.

The prestige of gas is being enhanced daily as it performs better, daily.

Take the lighting of the dining room. In Fig. 1 we have the dome at its best; good lines—lamp being high; neck of leaf design which will not show discoloration. Then look at its successor in Fig. 2. The amber dish from which the soft colored, diffused light comes to the table, and where the ceiling and the walls are sufficiently lighted.

When you demonstrate that these effects can be obtained with the *dependable* product, gas immediately obtains a prestige at least equalling that obtained by reading about "Nancy Gay."

In the living room we want light enough so that we can read; the source should be large and of uniform brightness; and the unit should be of attractive design. One which meets these requirements is shown in Fig. 3 It will supply plenty of light, being shallow, allowing plenty of light to be reflected to the ceiling where it will be reflected downward sagain.

A large source of light is presented as the unit is 18 inches in diameter, and it will be uniformly lighted owing to the quality of the glass.

When a man reads his paper, entertains his friends, and sometimes his family, in a room lighted in this way, will he not be in a more receptive mood when the Industrial Gas Engineer calls to interest him in a new appliance for his factory, than if the only gas he sees is that in a combination unit, built in restraint of trade as far as gas is concerned? The opportunity as well as the possibility of increasing the field of usefulness of gas becomes lessened when gas is not used for lighting.

Good lighting with gas, gains that product a prestige which no amount of advertising or electric "Cook with Gas" signs can bring.

The American housewife is influenced in favor of having the new home piped throughout when she knows good gas lighting. Many would answer this by saying "Of course!" But do you who go to conventions where lighting is not discussed even though reports are

Fig. 1.—The dome, too much light on table. Gloom in the rest of the room.

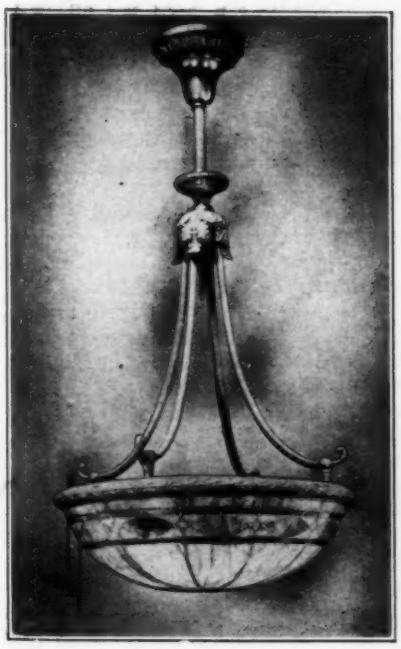


Fig 2.—The amber dish. Soft tones, good colors, cheerfulness.

Fig. 3.—Chain hangers are sometimes preferred.

presented—do you realize that thousands of American housewives don't know what good gas lighting is?

Do you realize that in many cities where combination companies operate the modern gas lighting units are suppressed? or, as one man expressed himself, " we try them down cellar."

Fortunately the number of cases such as this is becoming smaller every year, but there are still enough of them to warrant this sermon being written.

For store lighting there is an increasing demand for the so-called semi-indirect type of lighting. Direct lighting with either arcs or smaller units is considered old fashioned. Here again we can supply the demand by installing simple fixtures, which are also highly efficient.

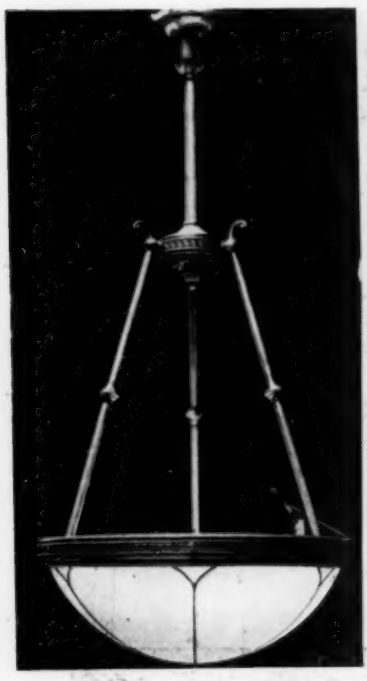


Fig. 4.—Simplicity and utility.

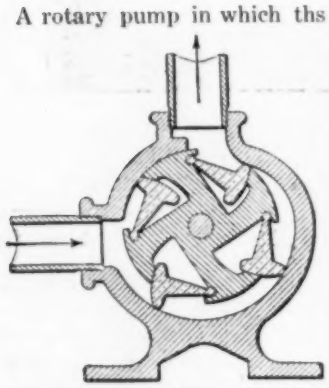
Fig. 5.—The colored squares can be had in the tones of the furnishings.

Two types shown in Figs. 4 and 5 have one advantage not found in the older forms of gas lighting and that is the ease with which the quality of light can be controlled. The burners are made to carry either 2, 3, 4 or 5 mantles and can be changed to suit conditions. The trouble and expense of removing lamps in the summer time can be overcome by changing the burner to a smaller intensity. We do not want as much light in the summer as in the winter and the simple expedient of changing the burners will hold lots of summer lighting business.

These units have been tested and found satisfactory. Their cost puts them within reach of all. Their use will add to the prestige of gas as an illuminant, and aid in its further application in the home, the office and the factory.

Rotary Pump with Automatic Adjustment for Wear.

A rotary pump in which ths revolving parts automatically take up added clearance due to wear is shown in the accompanying cut. The pump chamber is elliptical, and the runner has four arms, to each of which is pivoted a bucket. These buckets hang free and are held against the wall of the chamber by centrifugal force, no springs being employed. With any wear of the contact surfaces of the chamber and buckets, the buckets simply swing a little farther out so as to maintain the contract.



Rotary Pump with Automatic Adjustment.

This pump is used for handling liquids free from grit, including gasoline, oil, tar and asphalt.

Industrial Appliance Business.

[From the paper read by W. H. BRADLEY, before the New England Association of Gas Engineers; and some of the discussions thereon.]

It is a well appreciated fact that with the ever increasing competition with electricity, it is necessary for gas companies to utilize and develop every field that promises an increase in their sales. It is also a fact that in practically all territories served by gas companies there are prospects which are so promising that the gas company would find it hard to justify a neglect of the opportunity to increase their sales through the industrial sales department.

Prior to 1910 gas companies generally, and especially in this section, had done very little toward working up industrial business. Manufacturers large and small were obliged to buy such burners, furnaces and miscellaneous equipment as they thought they could use from the industrial appliance makers. Practically all the sales of industrial appliances were made by salesmen representing the manufacturers of these appliances; frequently upon being installed such appliances failed at first to give satisfaction, whereupon the gas company was called in. In many cases it was found that the gas companies had no men familiar enough with the appliances to render much, if any, assistance, which involved getting a man from the manufacturer of the appliance to do the work.

It is not our purpose to discuss technically the relative merits of industrial appliances for various purposes. We will rather strive to make clear to you some of the methods adopted in Springfield in securing this business, in the hope that our practices may suggest something of value to others. In 1910 we entered the industrial field actively. Our rates were then as now, 85 cents for the first 50,000 cubic feet, 75 cents for the next 100,000 cubic feet, and 65 cents all over 150,000 cubic feet, which we considered favorable for the bnsiness.

The first thing we had to do was to secure an industrial appliance salesman. We studied carefully the qualifications of all of our men whom we thought might fill such a position successfully. We wanted to do this rather than bring someone in from outside. Right here we want to make clear our opinion that the success of a department of this kind depends very largely on the type of man chosen to conduct it. The man we selected was one who had been for years connected with various operating departments of our company's business, who understood the fundamental principles of gas manufacture and distribution. Having settled on the man, the next step was how best to educate him. We took the matter up with a large industrial appliance concern who sent a man to advise with us. At his suggestion and with his assistance we secured an equipment for demonstration purposes, and installed it in our office. It consisted of various types of burners, furnaces and like apparatus, including a blower, pyrometer, pressure gauges and test meters; the blower operated by a small gas engine.

This man then accompanied our representative to various manufacturers to ascertain what prospects there might be in the territory. The experience gained in this way, coupled with the visit of our man to the factory of the industrial appliance concern, where he spent several days studying various types of equipment and their operation, furnished the basis upon which our industrial appliances business has been developed,

Our man took up his work with enthusiasm, and while at first he was often obliged to call upon the appliance manufacturer's experts to come to Springfield and help him, to-day he can himself handle satisfactorily almost any problem, Not only is he constantly after new business, but he makes regular inspections of all installations to see that they are working properly and to assist and advise the consumer.

We now have another young man being trained by the first one, and who is showing considerable aptitude for this business. Based upon our own experience, we cannot bear too strongly upon the value of the demonstration equipment; foremen in factories many times have to be "shown" before they will accept the gas man's representations that the substitution of gas fuel will be to their advantage, and the easiest way to convince him is to induce him to bring some of his work to the demonstration room and do it. In nine cases out of ten, such procedure will clinch the business.

There is a concern in our city who are very large manufacturers of novelties, toys and games, a case where the casual observer might think that no particular possibility existed for the use of industrial gas. However, our man called and found that they operated a tool room making dies and small tools, and hardening and tempering were being done with coal. This opened up a live prospect. The representations of our salesman, that we could save them

money, were skeptically received. We had them bring some of their work to our demonstration room, and the results surprised them so much that they continued for three days bringing more material to work up, to be absolutely sure that there was not a flaw somewhere in the experiment. They were so much pleased by our demonstration that they gave us an order for an entire equipment for doing this work, which has resulted in their becoming one of the very large users of gas in our city. We could never have secured this business without the demonstration equipment.

This equipment helped us with one of our other earlier installations, a factory making automobile and bicycle chains. They had used gas to some extent for lighting, from $6 to $7 per month, and had made one experiment on an industrial appliance some time previously, about which we knew nothing. The results of this experiment were so unsatisfactory, because they did not know how to operate the machine, that they would not consider the use of gas fuel. Our man, after much effort, secured an interview with the president of the company, and finally convinced him that neither the gas nor gas company were to blame for the failure, and secured permission for a trial by his foreman in our demonstrating room. This proved so satisfactory that a trial installation was ordered from which many repeat orders have been received, and their bills now run from $250 to $350 per month. One burner alone in this factory consumes 1,200 cubic feet of gas per hour. We are firmly convinced that our position is right in regard to the demonstration outfit, for by working by this method, we are gratified to find that we have yet to remove an industrial appliance for any other purpose than to put in a larger one. The industrial appliance man finds every prospect a special case, requiring careful study from every point of view before making a recommendation. However, each case contributes to the aggregate of his experience.

An interesting and very profitable installation, requiring special observation and study of conditions, was made in one of the local breweries three years ago. Our man learned something about the operation of breweries; that it was necessary to dry out large vats from time to time. This work had been done with charcoal, which was very unsatisfactory on account of the dirt and inconvenience and deposit of ashes inside the vat, which should be kept very clean. He found that they were melting pitch for spraying the interior of kegs and barrels, using wood, which cost them nothing, as they used old barrels. It is also necessary to brand kegs and barrels, and they were heating branding irons with gasoline, which had a material effect on the insurance rate. All these operations are now done with gas. We furnished a burner operating with air at pressure, which dried out the vats thoroughly and quickly. If there were no fuel economy the indirect economy in the result justified the installation. In melting pitch, no matter how they manipulated the fires, there were periods of high heat and of low heat, resulting in delays. Gas burners were installed and even if no direct economy in fuel results the saving in time more than warrants the investment and expense in operation. One man handled all the barrels they could supply under the old system, it now takes 3 men to handle the barrels to and from this apparatus. In branding there were delays, waiting for the gasolene flame to heat the branding iron, and a man was obliged to stay through the noon hour to take care of them. Our man was told that if he could heat the branding irons in 25 minutes our installation would be considered successful. When he heated them in 4 minutes the master brewer was astonished and could not complete his installation quickly enough. The introduction of these appliances became known to the employers of other breweries, and their employees insisted on the installation of them, in fact, threatened to strike unelss they were put in. The reason these men insisted on the complete gas equipment was that with this installation they were able to do their work so much more easily, and still receive the same pay as the men who were obliged to bother with other types of fuel. We have equipped all of the breweries in our territory.

Following is another very interesting and successful installation recently made by us. A large shop making machinery for various purposes was confronted with the necessity for providing some means whereby hardening of expensive parts could be accomplished without the tremendous shrinkage caused by uneven temperatures resulting from the use of coal or oil furnaces or even gas blast furnaces, all of which had been tried. One of the men in the factory told our man that if he could get a furnace operated by atmospheric gas burners that would do the work, a tremendous saving could be accomplished because the part being hardened would absorb the heat more gradually and evenly. A temperature of 1,850° F. was required, and we had never heard of an atmospheric burner which could attain this, but this man assured us that he had worked on such furnaces in three cities abroad. This machine was made in England, and we ordered one.

We have personally observed this furnace at a temperature of 1,850° F. without all the burners in operation. The operator claims to have reached 2,100°. We have sold two more of the furnaces, one to this same concern and one to a neighboring factory whose foreman saw the first one in operation.

Candy factories, large and small, give opportunity for gas installations. We have a very large candy factory in our territory, where we arranged for a trial installation of one piece of apparatus. The first burner for trial was installed about 3 years ago, and in October, 1914, we removed the last coal burning appliance they had. Practically every candy factory in our city now uses gas almost exclusively.

We have described in detail some installations which have resulted in a large increase in sales of gas. There are many others even more unique, that in themselves have not been such material revenue producers, but in the aggregate have helped us to a material increase in gas output. As examples of installations perhaps not so common, we would mention furnaces for bending glass, furnaces in saw factories for tempering, hardening and annealing, and brazing furnaces. We also have installed very generally, the more common types of industrial appliances, such as soldering irons and furnaces, brazing tables, tire heating machine, vulcanizing equipments, laundry installations, steam boilers, pop corn machines, ice cream cone machines, burners for kettles in which potato chips, lobsters and crabs, are boiled or fried, furnaces for melting type metal, and blow pipes and special burners for every imaginable purpose. Gas ovens have been extensiveiy installed for japanning, core drying, enameling and baking. It is clear from the foregoing that we have done much to secure industrial gas business. We have made many large installations, but have not neglected the smaller user. In practically every store along the street, heat in some form is required. This business we consider very valuable because in cases of large installations we feel the loss if the factories are obliged to shut down. Uses of gas in the smaller shops and stores are so diversified that the effect is not so quickly felt. This proves our contention that in any city there are many industrial gas prospects, whether or not the city is known as a manufacturing center.

The industrial salesman who undertakes the sale of an appliance just for the profit on the appliance is not serving the interests of the gas company, who are primarily interested in the sale of gas and who recognize that the increase in sales of gas must be based on service. To sell an appliance that is sure to prove disappointing is not service, and no industrial appliance department can hope to succeed if business is secured with any such idea in view. The gas company representative must first satisfy himself that there is an opportunity for improvement. He cannot take chances, he cannot install an appliance without knowing that it will operate satisfactorily, and be the strongest possible selling argument for selling other gas consuming appliances for like conditions.

Gas ovens for bakeries, hotels and restaurants may not, strictly speaking, he considered industrial appliances, but to bear out what we have said in regard to securing business, we give a typical example. Our man had been endeavoring for a long time to induce the proprietor of a hotel to install a gas oven to displace a coal one. In order to convince him of its desirability, our man took him to a hotel where one had been installed. The baker was working with the oven at the time, and liked it, but the proprietor thought the bills were high. The prospect asked what work was done with the oven, and found that they baked each day about 82 2 pound loaves of bread, 5 dozen pies, 50 dozen rolls and such roasts of meat or other foods as might be required, and the bill the previous month was $15. Without any hesitation the prospect said, "Get me one of these ovens, and if I can do that work for twice that money I will be satisfied." Incidentally, this $15 included gas used for a doughnut cooker, where they fried about 30 dozen doughnuts each day. The prospect to whom we sold the installation takes every opportunity to tell us how pleased he is with the equipment. Since that time nearly every hotel and restaurant in our city have been equipped with ovens and other appliances.

It has been tritely said that a satisfied customer is the company's best asset. We might modify that to read that a satisfied customer is the industrial department's best salesman.

Discussion.

MR. WARE—Our latest work in the industrial line is the addition of a chocolate plant for fuel and power. The power plant is over 600 horsepower, the largest unit a horizontal engine, one of a very few in this part of the country. The consumption is running at

the present time something over 3,000,000 a month. I should like to ask the members of the Association if they will be good enough whenever they get data, either from tests or from actual operating, of any new or unusual operation, to send it to the Central Development Bureau, National Commercial Gas Association. We are trying to build up there a file of data of all kinds, which will be available to the country at large, to help us in meeting our problems, and the more you give us, the better work we can do for the industry. Last autumn I ran across a little plant where they were using gas for compressing briquettes. A gas and air mixture was pumped at something over 100 pounds pressure into a cylinder, touched off by an electric spark, and, through a series of levers, brought a plunger very sharply down on the briquette. The operation was quite rapid, and the pressure about 100 tons per square inch.

MR. NORCROSS thought the greatest hindrance to the accomplishment of results is the difficulty of getting well trained, capable industrial appliance salesmen. There is a splendid field for that kind of man, and many of us don't know where to look for him. He recollected an unusual sale on one of their country lines of a gas engine for use in the mechanical milking of cows. One would hardly look to the farm for industrial uses for gas, but the business is waiting for us, wherever we look.

MR. CRAFTS said that in Pittsfield they sold considerable gas for industrial uses, but the appliances have been sold without any very systematic work on their part. The proportion of sales for industrial uses is high because of the gas sold to the General Electric Co.

MR. CLINTON said that in Worcester there were some interesting industrial installations. The American Steel and Wire Co., a part of the United States Steel Corporation, made their own gas up to a short time ago. Worcester has one price for gas, 75 cents. When they found, however, that the heat units from the town gas were much more uniform than they could make they were won over. They make millions of springs, heating them in gas furnaces, and they use more and more gas; when running at anywhere near capacity, nearly 1,000,000 cubic feet a month. Worcester is an industrial centre, and they are selling furnaces all the time. It is a great field, practically a virgin field.

MR. BLANCHARD told of a use of gas in the granite cutting industry. A lot of this work is done by compressed air and pneumatic tools. The release of the air in the operating of these tools not only freezes up the tools, but chills the hands of the operator, even in moderately warm weather. To overcome this they place an ordinary gas water heater in the air line. Another use for gas is in tool sharpening. The tools are placed on a movable table which passes through a gas heated furnace, they are sharpened under a trip hammer and replaced on the table which passes through a temporary bath. This is done with one heating, and two men do the work of eight blacksmiths, using from 50,000 to 80,000 cubic feet of gas per month. In a shop making saddlery and builders' hardware, they operated twelve coal heated furnaces, in each of which they melt six crucibles of metal per day of nine hours, making about 270 pounds of metal per furnace. They installed a gas furnace and operated it for part of one day with the following results: Time from 7:04 A.M to 11:10 A.M., or 263 minutes; melted ten crucibles of brass and copper, amounting to 413.0 pounds, using 1,400 cubic feet of gas. Average gas per pound of brass 3.36 cubic feet; average gas per minute 5.33; time required to melt one pound of brass 37.8 seconds.

MR. ARTHUR HEWITT told of an installation in Toronto which he thought unique, the application of gas in Reel Ovens of very large capacity. They had an installation offered for experimental purposes, on the understanding that the $375 it was estimated to cost to put it in the experimental plant would be paid if it succeeded. The bakery paid for it. In making some extensions to their building they conceived the idea of putting these Reel ovens on the seventh floor, necessitating the use of gas. They installed two 8-inch services, a battery of seventeen 250-light increased capacity meters to supply a consumption estimated to reach a minimum of 30,000,000 a year and a maximum of 100,000,000. It is sold on a sliding scale arrangement, whereby if they use 30,000,000 feet they will get a rate equal to 55 cents a thousand. For such purposes it is necessary to get down to about this figure, but at that price it is a complete success. These ovens are used for baking soda biscuits, and while they may not be saving anything in dollars and cents over the operation with coal, they are accomplishing what they need to accomplish at a comparatively little excess over what coal would cost them, and doing away with the inconveniences of coal.

MR. MORRISON told of an installation of three or four Reel ovens used for drying shoe forms.

MR. JENNINGS said his company had applied a 5-horse power boiler to a holder they have away from the works, and have for 2 years been heating this steel tank holder of 100,000 cubic feet capacity. During the past two seasons it was only necessary to run the heater for about three months. An electrically driven pump circulates the water, and it seems possible to heat the holder by that means cheaper than any other way.

MR. AARON told of an instance in Manchester. A producer gas plant of a 125-horse power operates a 100-horse power engine, and when a very lean streak of gas is obtained, owing to shaking down the fire and other causes which might make it necessary to shut down some part of the plant, they turn on the city gas and enrich the mixture. This consumer was willing to sign an agreement guaranteeing a specified consumption, or in lieu of that an amount sufficient to pay for meter rent, interest on investment, etc.

Affiliation With the Institute.

[Report of the Committee on Affiliation, Illinois Gas Association.]

The Illinois Gas Association is affiliated with the American Gas Institute by virtue of an agreement entered into under Section 55 of the Institute's Constitution original wording. The Institute has twice amended this Section 55, the last change being made at its last annual meeting. These changes have been made in an effort to to make affiliation more appealing to the other State Asscia-tions. Our opinion has not been asked as to the desirability of the change, and they do not effect our contract. However, we have found that the contract entered into by us is not workable, that the Institute has not the machinery to make it effective. No special virtues were seen in the amendments made to Section 55, and the impression has been gaining among our members that we were experiencing little benefit from the affiliation. The expression given to this view in some measure at our last meeting, attracted the attention of the then President of the Institute, Mr. Gartley, whom we were so glad to welcome at our meeting. Mr. Gartley later presented our views most sympathetically to the Board of Directors of the Institute, and through his efforts a committee was appointed by the Institute to consider the whole broad question. Your Committee has been represented at the meetings of the Institute Committee and has worked for an expression of your views. A preliminary report has now been made to the Board of Directors of the Institute as follows:

That the Institute Agreement should add a new class of members to be known as affiliated members, which would consist of members of affiliated state and district organizations, who would pay to the treasury of their association $2 in addition to the regular dues, which would be transmitted to the Gas Institute and be their annual membership dues as affiliated members. For this $2 they would receive the "Gas Institute News"; they would receive the Proceedings at the same cost as members, instead of double cost that outsiders have to pay, and they would receive all publications of the Institute at the price permitted to regular active members; they would have the privilege of attending all meetings of the Institute, but would have no vote on the floor; that provisions should be made for the active co-operation of the Public Relations Committees of State and district associations that become affiliated with the Institute with the Public Relations Committee of the Institute; that when the Public Relations Committee of the Institute is put to any expense in investigations or missionary work at the request of the Public Relations Committee of affiliated organization, the affiiliated organization would reimburse the American Gas Institnte for the expense involved; it being the opinion of the committee that the best way of doing this would be for the affiliated organization to collect necessary funds from the companies in the State or district affected, so that the American Gas Institute would not be put in the position of being subsidized directly by public utility companies; that the affiliation agreement should also provide for co operation between the Technical Committee of the Institute and the Committee on Technical Papers, or whatever it might be corresponding thereto, of the affiliated organization; that the Institute in its turn would agree to print the preliminary announcements of the meetings of all affiliated societies in the "Institute News"; that it would also print abstracts of the papers prepared in the affiliated organizations that were approved by the Technical Committee of the Institute; that in addition any papers prepared by and presented before any of the affiliated organizations at the request and under the supervision of the Technical Committee of the Institute, would be printed in full in the "Institute News."

Your committee was represented at the Institute directors' meet-

ing last night by your affiliation representative, Mr. Barrett, and by the chairman of your Affiliation Committee. The subject was fully canvassed, and it was decided to offer the report of the Institute Committee for consideration and advice to the directors of the various affiliated associations through their secretaries, and to the general membership of all the associations by publication in the Institute News. Your committee took the stand that the time had been reached when any further change in section 55 of the Institute constitution should be by agreement with the associations already affiliated; that previous affiliation contracts should then be annuled and new contracts entered into under a mutually acceptable arrangement. The viewpoint that the associations now affiliated should be consulted finally prevailed. Your committee feels that the changes suggested in a preliminary way by the Institute Committee are meritorious and worthy of careful consideration. It is evident that the Institute has awakened to the necessity of introducing our vitality into these agreements, making them workable and mutually beneficial. We believe that the Illinois Gas Association should cordially respond to this agreement, and should indicate full willingness, and we might say anxiety, to co-operate in the work. We therefore recommend the following action at this meeting: "First, that the Board of Directors appoint a committee on affiliation for the coming year from their own members; second, that the secretary be instructed to notify the Institute that the Illinois Gas Association desires to annul its present affiliation agreement within the year and enter into a new agreement; third, that the secretary be instructed to notify the Institute of the appointment of the above mentioned committee on Affiliation, composed of directors of the Illinois Gas Association,, and that the Illinois Gas Association is ready to co-operate with the Institute through this committee and through its entire board of directors if necessary in formulating a new general plan of affiliation, together with all necessary changes in the respective constitutions affecting such plan."

This report was signed by F. W. Bedard, W. F. Barrett and H. L. Rice, and was adopted by vote of the association.

London Gas Referees' Regulations for Determining Calorific Power.

The Metropolitan Gas Referees have issued their notification for the current year containing directions for official testing and for taking of calorific power.

In the testing places for the Gas Light and Coke Company the standard calorific power of the gas supplied must be 540 B. T. U.; provided that the company shall not be liable to any penalty or proceedings for or in respect of any deficiency in the calorific power of the gas supplied in accordance with the express provisions of this Act. One test only for calorific power shall be made at each testing place daily; but in the event of any test showing below the standard to an extent exceeding 7½%, the examiner shall give notice thereof to the company, and a second test shall be made at an interval of not less than one hour, and the average of the two tests deemed to be the calorific power of the gas at such testing p'ace on that day.

In the testing places for the South Metropolitan Gas Company and for the Commercial Gas Company the testing for calorific power is to be made on such days as the controlling authority direct.

The calorimeter to be used must be one that has been examined and certified by the Gas Referees. (A description of the calorimeter is given in an appendix).

A unit of heat, termed a British thermal unit (B.T.U.), is defined as the amount of heat that will raise the temperature of 1 pound of water 1° F. The metric unit of heat, termed a calorie, is the amount of heat that will raise the temperature of a kilogram of water 1° C.

The expression "British thermal units," means British thermal units gross per cubic foot of gas. The heating or calorific power of any sample of gas is represented by the number of units of heat produced by the combustion of one cubic foot of such gas measured at 60° F. and under a pressure of 30 inches of mercury.

"When the products of combustion are cooled before they escape, the heat imparted includes that due to the condensation into water of some of the steam formed by combustion, and that due to the cooling of the water thus formed from its boiling point to a lower temperature.

"The maximum calorific power which gas can thus exert is determined directly by the calorimeter. This, subject to small corrections due to contraction in consequence of combustion and to atmospheric conditions, is a true measure of the total heat value of the gas, and is generally termed the gross calorific power of the gas. But in many cases where gas is used as a heating agent, the steam formed escapes into the air uncondensed, and thus the heat due to the condensation of the steam and the cooling of the water so formed is not utilized. The amount of heat thus lost can be estimated, and if it is subtracted from the total heat yielded by combustion in the calorimeter, another value is obtained, termed the net calorific power of the gas. Since, however, when steam escapes uncondensed the uncondensable products of combustion also pass away at a high temperature, and since the loss of heat thus arising is commonly the greater of the two, the customary partial correction from gross to net has not much significance.

"In order to test the gas for calorific power, the gas shall first pass through a meter and an efficient governor—either a balance governor or a diaphragm governor of a pattern approved by the Gas Referees. The connections between the meter and the calorimeter shall be tested for soundness at least once a month, and also immediately after every test of which the result is less than 500 B. T. U. gross. For this purpose the gas shall be turned on and the tap on the calorimeter closed. If, after the lapse of not less than two minutes, the meter hand is moving as much as one division in four minutes, the leak shall be located and made good, and the connections again tested. The gas shall be turned on and lighted, and the form of the two flames observed. If either is out of shape, this must be rectified by clearing the burner or by substituting another burner. The tap of the calorimeter shall then be so adjusted as to allow the meter hand to make one turn in from 60 to 75 seconds. The water shall be turned on so that when the regular flow through the calorimeter has been established a little may pass the overflow of the funnel and trickle over into the sink. Water must be poured in through one of the holes in the lid until it begins to run out at the condensation outlet. The calorimeter may then be placed upon its base. The measuring vessel carrying the change-over funnel should then be placed so that the outlet water is led into the sink. The hot water outlet-tube of the calorimeter should be above, but should not touch, the change-over funnel.

"After an interval of not less than 30 minutes, the gas examiner, after bringing the reading glasses into position on the thermometers used for measuring the temperature of the inlet and outlet water, shall make the following observations: When the meter hand is at 75, he shall read the inlet temperature; when it reaches 100, he shall move the funnel so as to direct the outflow into the measuring vessel, and at the same time start the stopwatch. When the meter hand reaches 25, he shall make the first reading of the outlet temperature, and continue to read the outlet temperature at every quarter turn until fifteen readings have been taken. The meter hand will then be at 75. He shall also, at every turn of the meter, except the last, make a reading of the inlet temperature when the meter hand is between 75 and 100. When the meter hand reaches 100, after the last outlet temperature has been read, he shall shift the funnel so as to direct the outlet into the sink again, and at the same time stop the watch. The barometer and the thermometers showing the temperatures of the effluent gas, of the gas in the meter, and of the hygrometer, shall then be read. If the time of four revolutions of the meter hand is less than four or more than five minutes, the rate shall be readjusted, and after an interval of fifteen minutes the test shall be restarted. The time of four revolutions of the meter hand shall be entered on the form of Appendix L. The mean of the four readings of the inlet temperature is to be substracted from the mean of the fifteen readings of the outlet temperature, and the difference is to be multiplied by three times 3.968, and by the number of litres of water collected, and the product divided by the tabular number. The result when corrected for contraction and for atmospheric conditions is the total heat value of the gas measured in B. T. U.'s per cubic foot. To facilitate these operations, the logarithm of 3 × 3.968 is printed on the form at the end of Appendix L; and the logarithms of the reciprocals of the tabular numbers are tabulated in Appendix G. This logarithm may be found, therefore, in the table directly from the meter thermometer and barometer readings, and the addition of this to the other logarithms will have the effect of dividing by the tabular number.

"When gas is burned in a calorimeter, the escaping products of combustion may be either warmer or cooler than the gas and air entering the calorimeter, and they occupy a smaller volume and are saturated with water vapor. In consequence they may contain a small quantity of heat due to combustion, which must be added to the calorific value found as described above; or where the circulating water is sufficiently cool they may give up heat not due to the combustion of the gas, which similarly must be substracted

The following is the form for calculating the calorific value:

Form and Example of Calculation.

Water: Inlet.	Water: Outlet.		
13.54° C.	32.72° C.		
	.72	Time of four revolutions of meter hand, 4 minutes 24 seconds.	
	.72	Barometer, 29.80 inches.	
		Water collected, 2,305 litres.	
		Grains per Cubic Foot.	Grains.
		Dry bulb..... 61° F. a = 4.6	$7a$ = 32.2
		Wet bulb..... 57° F.	b = 5.8
.55	.72	Meter..... 60° F. b = 5.8	$7a + b$ = 38.0
	.72	c = 6.2	$6.6c$ = 40.9
		Effluent gas.... 62° F.	
	.72	d = 5.30	$6.6c - (7a + b)$ = + 2.9
	.73		
.57	.73	Effluent gas dry bulb = e = + 1° F.	B. T. U.
		0.00022 de = + 530 × .00042	= + 0.12
	.73	0.15 (6.6c — 7a+b) = 2.9 × .15	= + 0.43
	.74		
	.75	Correction to be added to calorimeter result	+ 0.55
.58	.75	Log. 3 × 3.968	= 1.0757 (⅓ cubic foot and conversion to B.T.U.)
	.75	Log. 1 ÷ tabular number	= .0031 (correction for volume of gas)
13.56	.74	Log. 19.17	= 1.2826 (rise of temperature)
	.74		
Condensed water = 59 c. c. in 30 minutes = 118 c. c. per hour.	15) .48	Log. 2.305	= .3627 (litres of water collected)
	32.73	Log. 529.8	= 2.7241 (uncorrected calorimeter result)
	13.56		
Rise of temperature	19.17° C.	Corrected + 0.6	
		530.4 = Total heat value.	

from the calorific value. In order to make this correction, the temperature and humidity of the air near the calorimeter shall be determined by the use of the ventilated wet and dry bulb hygrometer described in Appendix L. This shall be placed near the calorimeter. Not less then ten minutes before the calorimeter readings are taken the ventilating gas flame shall be lighted and adjusted so as to be about 1½ inches long.

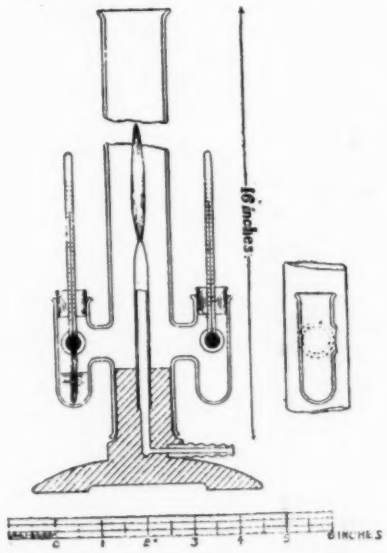
"The readings of the dry and wet bulbs shall be found in columns 1 and 2 of Glaisher's Hygrometrical Tables. On the same line in column 7, headed 'Vapor in a Cubic Foot of Air,' will be found the grains of water contained as steam in a cubic foot of the air entering the calorimeter. Call this a. The reading of the meter thermometer shall then be found in both columns 1 and 2, and the corresponding number of grains of water in a cubic foot of the gas will be found in column 7. Call this b. The temperature of the effluent gases shall then be found in columns 1 and 2, and the number of grains of water in a cubic foot of these gases will be found in column 7. Call this c. On page XIV. of the same tables the weight in grains of a cubic foot of saturated air at the temperature of the effluent gases shall also be found to the nearest unit. Call this d. Subtract the reading of the dry bulb thermometer from that of the thermometer giving the temperature of the effluent gases, and call the difference e. If the effluent gas is cooler than the air entering the calorimeter, this difference will be negative in sign.

"Find the value of $0.15\ (6.6\ c - \overline{7\ a + b}) + 0.0022\ de$. The figure so obtained is the number of B. T. U. to be added to the result obtained directly from the calorimeter in order to obtain the gross calorific power or total heat value of a cubic foot of gas. If $7\ a + b$ is greater than $6.6\ c$ the first term in the expression above will be negative, and its numerical value will therefore have to be subtracted and not added; and similarly if the effluent gases are cooler than the air entering the instrument the second term will be negative, and its numerical value will in that case have to be subtracted and not added.

"In addition to the observations described, the amount of condensed water resulting from the combustion of the gas shall be measured. For this purpose the condensation water shall be led into a flask not less than 15 minutes after the calorimeter has been placed in position, and the amount collected in not less than 20 minutes shall be measured, and entered with the time on the form. If the water collected shows a rate in excess of 150 c. c. per hour, the unions and coils of the calorimeter shall be examined for leakage. If this is found, the testing shall be discarded.

"As the existing thermometers for reading the water temperatures are divided on the centigrade scale, and the water vessels for measuring the water are divided in litres and decimals, the product of the observed rise of temperature and quantity of water gives the heat developed in calories. As this figure must be multipled by 3.968 to convert calories into B. T. U., the logarithm 1.0757 [in the form] includes this factor, as there explained."

Next are directions for taking the pressure and the meters to be used.



Then follow the usual appendices. Appendices A, B and C relate to the 10-candle pentane lamp, the preparation of the pentane, etc. Appendix D contains a description of the table photometer; Appendix E details of the "Metropolitan" No. 2 burner; and Appendix F, Mr. Harcourt's aerorthometer is shown. Appendix G consists of tables—the first giving the tabular numbers to facilitate the correction of the volume of gas measured over water at various temperatures and under different atmospheric pressures; and the second, the logarithms of reciprocals of the tabular numbers, being logarithms of aerorthometer readings. Appendices H and K deal with the tests for sulphuretted hydrogen and sulphur.

In Appendix L is a description of the gas calorimeter designed by Mr. Boys, which has been amplified by the addition of the following paragraph, relating to the ventilated wet and dry bulb hygrometer, shown in the cut.

"The main ventillating system consists of a single piece of glass of the shape and dimensions shown in the figure. This stands upon a metal base which, by means of a glass tube, carries a single rat-tail burner adapted to make a flame about an inch-and-a-half high. The air to supply the burner and chimney is drawn in through the the two holes opposite the thermometer bulbs, one of which is covered with cotton and connected by means of wick with the water in the cup immediately below. The glass tube fits easily over the stem of the metal base, which is covered with cloth or other soft material to prevent injury to the glass. The upper or chimney part of the glass tube may be made of metal fitting over a shorter glass tube; but the flame should in no case be obscured from view. The thermometers are divided into degrees F. Distilled water is to be used in the cup under the wet bulb."

Appendix M contains a description of the Referees' street lamp presure guage; and Appendix N, particulars of their 12 cubic foot measure designed by Mr. Harcourt. Appendix O gives an example of the form in which returns are to be made.

FINANCING PROBLEMS OF PUBLIC UTILITIES COMPANIES.

The Most Important Factor in Financing.—Utilities in two Classes Financially.—Why Private Ownership Prevails.—How Financing is Done.—Holding Companies and Management Organization.—Defend Your Industry.

[From a paper by WILLIAM H. HODGE read before the Minnesota Electrical Association.]

Electric light and power, gas, electric railway and telephone utilities in the United States to-day are no more completed than the development of our country is a finished thing. In every State opportunities exist for new utilities, and the extension and unification and perfection of those already established for the carrying of useful and needed service to constantly increasing numbers of people over constantly widening territories. Striking examples of what has been accomplished during the last 10 years can be found in Minnesota, as they are all over the nation. Achievements of the future hinge principally upon the ability to secure the great amounts of new capital required and the degree of encouragement accorded by the public through legislative and political action.

The most important factor determining public utility financing is the attitude of the people and of the individuals permitted to act as spokesmen on the political platform, in legislative halls and in the newspapers.

Were it not for unfair attacks upon public utilities, those under able management would have no great difficulty in obtaining ample funds at low prices for creating and extending properties and services, even during periods of depressed development such as we are now passing through. Considering the mistaken and often mendacious attacks made to obstruct their progress, the record of public utilities has been extraordinary, and of brilliant credit to the courageous and resourceful men—thousands of them—responsible for their steady progress. Accurate inquiry will reveal the history of public utility development in the United States to be an inspiring and admirable record—a narrative far different from the avaricious and unwholesome story which certain libelers would have people believe.

The public utilities of this country, in all respects, stand head and shoulders above similar industries in any other nation in the world. They are of far greater practical use to the people, and to a much larger proportion of the people at much lower actual cost. The electrical group—light and power, railways and telephones—have led the world in invention, evolution and application to the needs of mankind. Our public utilities, by the joint and lifelong efforts of inventors, engineers, manufacturers, financiers, investors, enterprisers, operators, managers, technicians, and last, but by no means least, skilled labor, have helped tremendously in building up Cities and States. They have contributed mightily to the wealth and welfare of the people, and their value to society has been immeasurably greater than their own financial reward. They have called forth, educated and trained, an army of not less than half a million loyal well-paid contented operatives and managers, not one of whom would willingly exchange his job for a similar position with any publicly owned enterprise, understanding fully that political favoritism would then displace efficiency and merit as a guage of continued employment and promotion. The utility companies have, on the whole, and particularly during later years under the newer and more efficient methods of management and financing, justified the faith of large and small investors, banks, insurance companies and others who have provided the indispensable and enormous amounts of capital. Despite the hostile and fallacious movements against them, their economic vitality has been so evident and the courage, initiative and resourcefulness of their operators so persistent, that they have clearly demonstrated their commercial soundness.

Public utility companies to-day are divisible into two classes. First, those long established and successfully serving large cities, whose permanency is unquestioned. These are, or should be, upon an investment basis. The additional capital they require from time to time to meet the needs and growth of their communities should be obtainable upon terms not far above reasonable rates of interest; unless unusual conditions prevail due to competition in a field where competition has no economic or moral justification, or to circumstances which deny correct technical methods or commercial prosperity.

The second division of public utilily enterprise lies within the speculative zone. This covers new undertakings, and includes many projects involving the construction of water power, the building of new systems and the reconstruction and grouping of properties upon a modern scale. As long as human judgment is fallible, the plans and visions of constructive men—no matter how much experience or ability—must await the decision of determining conditions over which they have no control. Financial support for such highly desirable construction can not usually be obtained on an interest payment basis. The greater the uncertainty the higher becomes the price of capital. Many projects of this kind have been carried out within the last decade. Some of them have already justified themselves financially, others are still in process of development; but every one has materially benefitted the communities served, enhanced the value of the peoples' property and advantageously served the general field of industry.

The United States has been built on the theory of effort and reward—a basic principle drawing forth the utmost endeavors of individuals. This economic principle animated the pioneer, explored and subdued the wilderness, settled the country, energized the most virile and daring and successful commercial progress in world-history, and annually induces nearly a million Europeans to cast in their lot with us. In conformity with this principle the public utilities were established and developed. The public invited and encouraged private enterprise, and private enterprise during the last 30 years has responded with wonderful efficiency. These are the fundamental reasons why our public utilities are operated by corporations rather than by municipalities or the State. It is because the people have believed in individual efficiency and enterprise, and distrusted paternalism and public ownership. Communities in granting franchises for gainful purposes have done so willingly. They have traded and are still trading for essential economic factors that they need, and which they thus secure with the least investment of their own individual and collective credit and capital, and in a manner best calculated to spur individual initiative to its most effective efforts. A present day instance is in the inducements which cities everywhere now hold out to the builders of interurban electric railways. Interurban lines are wanted badly. Franchises and rights of way are easy to obtain. The same individuals favoring such things may often be found urging the most vigorous and unmerciful treatment of utilities already established, that cannot move or convert their expensive

(*Continued on page 218*)

THE AMERICAN GAS LIGHT JOURNAL

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CHARLES H. WADELTON, Secretary and Manager.

SANFORD K. CAMPBELL, Editor.

NEW YORK, MONDAY, APRIL 5, 1915.

To Corrrct Misleading Publicity.

The National Commercial Gas Association, in conjunction with other Gas Associations, has declared its intention of keeping in touch with newspaper, magazine and trade journal publicity with the object of correcting inaccurate references to the use of gas.

Last year a special committee of the Association was able to correct, and thus to neutralize, a great many mis-statements; and most of them were found chargeable to ignorance rather than to a desire to mislead.

One can readily see the good effect upon the gas industry, and especially upon the locality where such advertisements appear, if the Association were able at once and emphatically to call the matter to the attention of the persons making such statements to give the true facts and head off repetitions of unfavorable publicity.

In order to do this the N. C. G. A. needs to have the co-operation of the gas companies of the country, and feeling that all gas men are awake to this particular danger which they are striving to counteract, the Association asks every gas company to assign someone in its organization to scan the local newspapers and other literature circulated in their territory, and send in copies of advertisements that are harmful. Upon receipt of a report, the Association will take the matter up direct with the advertisers, and see what influence can be brought to bear to reduce the likelihood of statements not according to fact reappearing.

This outlines a very important movement, and with proper co-operation a great deal can be done toward preventing and removing wrong impressions as to the economy, efficiency and safety of gas appliances. It aims to prevent mis-statements both for and against gas and its use.

Directors' Meeting American Gas Institute.

The fourth meeting of the Board of Directors A. G. I. was held March 17th at the Hotel Sherman, Chicago, Ill., and in the absence of the President, was called to order at 8:30 P.M. by the First Vice-President, Mr. Walton Forstall.

The following were present: W. F. Barrett, H. C. Blackwell, W. S. Blauvelt, Paul Doty, J. W. Dunbar, Walton Forstall, S. J. Glass, Carroll Miller and Geo. G. Ramsdell, secretary; also, by invitation, I. C. Copley and H. L. Rice, both former directors, and the latter Chairman of the Affiliation Committee of the Illinois Gas Association.

The Technical Committee submitted its monthly report.

Mr. Addicks, as Chairman of the Committee to Interview the Supervising Architect of the Treasury in reference to gas piping in government buildings, reported that the interview had been satisfactory in so far as it showed a willingness on the part of the Government to consider gas for lighting in government buildings, if the gas companies were able to furnish complete service as well as gas. The committee is taking this matter up with ten gas companies now supplying government buildings.

Mr. Blackwell, on behalf of the Committee on Securing New Members, reported that he expected to get in touch with the executives of gas companies and get from them the names of employees who might become members of the Institute.

There was further discussion as to the proposed adoption by the Institute of the Metropolitan No. 2 burner as a standard test burner for candle-power.

The Committee on Pipe Standards was given authority to pass upon, modify if necessary, and finally approve the design of special castings that may be desired by users and not contained in the Institute's standard.

There was a discussion of the suggestion that future nominations of officers be made several months prior to the Institute meeting, and the sentiment was favorable to this change.

The subject of attendance at the Gas Congress was considered. The feeling was that there would be a satisfactory number of delegates from the Mississippi River territory, The President was asked to communicate with the heads of gas companies on this matter.

The Committee on Affiliation made a report which was favorably received by the Illinois Gas Association Committee on Affiliation. The latter association resolved to terminate its present affiliation agrement with the Institute in order to take advantage of any new affiliation conditions that might become available by reason of changes in the Institute's constitution.

The Board accepted the invitation of the Pennsylvania Gas Association to attend its session and will therefore hold the April meeting in Philadelphia, probably on April 15th.

Upon invitation of the National Commercial Gas Association the Board empowered the President to appoint a committee to investigate, in conjunction with the Commercial Association, the desirability of a central testing laboratory.

The Board also empowered the President to appoint a committee of three to confer with and to meet with the National Commercial Gas Association's Committee on Reciprocal Relations with Other Associations.

The Board referred to the Public Relations Committee, with authority to appoint a proper committee, the invitation from the National Electric Light Association to co-operate in formulating a set of principles in accordance with which overhead or general expense might be distributed over departmental accounts.

Mr. Dunbar called attention to the fact that the Indiana Gas Association had taken cognizance of the recommendations contained in the last report of the Committee on Rates to the Institute; had appointed its committee on rates, and had asked the Illinois Gas Association to do likewise, with the idea that these committees should work in harmony with the Institute's Committee on Rates.

The Fair, the Institute Meeting and the Gas Congress.

The combination of the Gas Congress, the annual meeting of the American Gas Institute, and the Panama Pacific Exposition, all in San Francisco, makes September seem the right time for this years' vacation. In the April "Institute News" is a letter from a member who thinks that he expresses the feeling of a good many others in asking that the gas companies consider all these attractions in the West and arrange a way for those who want to make the trip. Here is his suggestion:

"Many members of the Institute attend the convention meetings through the courtesy of the companies they represent. A company usually appropriates a certain sum for a given item of expense, and if this particular item is kept within its ordinary limits for the coming convention it may reduce the attendance to one-third of the regular number; and while a good many of the members would like to follow the right spirit concerning this extra expense, they would not be given an opportunity. It is suggested to approach the companies who are in the habit of sending their representatives to the

yearly conventions of the Institute, and explain to them in a matter of fact way that it will be more dignified to send the usual number or representatives, or even to increase the number, and that it can be done without much extra cost to the company by allowing the members who would have the chance to attend if it was nearer, to stand part of the unusual time and expense connected with visiting the Fair. I know there will be little trouble with the time element; anybody will sacrifice his summer vacation for this. Even with the additional expense some details could be worked out to meet the conditions, which would result in an attendance at the coming convention in keeping with the importance of the occasion, and demonstrate the vitality and enterprise of the industry."

British Gas Undertakings.

A report just issued by the British Government shows 1,235 gas undertakings in England and Wales, 256 in Scotland, 110 in Ireland, 163 in Australia, 57 in Canada, 15 in other British possessions and 18 British companies owning gas plants on the continent of Europe and other localities. In England 1,002 gas companies are privately controlled and 233 municipally owned; in Scotland 195 are privately and 63 municipally owned, and in Ireland 84 privately and 26 municipally owned. For the year ending June 30, 1914, the output of English plants was 203,297,934,000 cubic feet; of Scotland 19,923,417,000 cubic feet, and of Ireland 5,974,347,000 cubic feet, a total of 229,195,698,000 compared to 220,741,818,000 in the preceeding year. This total was distributed to 7,650,812 consumers.

Of aggregate output, municipal plants supplied 82,288,204,000 cubic feet to 2,831,720 consumers, or 36.9 per cent. of total. Municipal gas supply in Scotland is on a much larger scale than in other parts of Great Britain, as all the large Scottish towns own their gas plants, and 84.5 per cent was made in municipal plants. In England 30.5 per cent. was so made, and in Ireland 52.2 per cent., the latter's large figure due to the fact that Belfast owns its gas plant.

The London companies, all privately owned, supplied 1,535,091 consumers with 56,521,341,000 cubic feet of gas in the year, producing 25% of the total output and supplying 20% of consumers in the United Kingdom. The Gas Light and Coke Company, claiming to be the largest gas company in the world, made 29,937,322,000 cubic feet, and sold it at an average of 65 cents a thousand. Other companies in London charge less; the South Metropolitan 54 cents, the Tottenham Company 50 cents and the Wandsworth Company 43 cents. During the year the number of consumers in Great Britain increased from 7,333,401 to 7,670,812, more than 1,000 added every working day. Consumers using slot meters made up the greater part of the increase, gaining 166,000. The use of gas for cooking is growing steadily, the number of gas stoves in use increasing from 3,504,192 to 3,765,207. Although use of electric current for street lighting is growing, there still 779,442 incandescent gas street lamps in use.

New England Section, National Commercial Gas Association.

One hundred and twenty-five members of the New England Section of the N. C. G. A. gathered at the New City Club, Boston, on Friday evening, March 26th, and listened to the reading of one of the most interesting papers ever presented before that body.

Before the session, President John L. Tudbury led the line of march to the banquet hall, where a tempting luncheon was served, 77 members, representing appliance manufacturers and gas companies partaking. At 7:30 the order was given to adjourn to the lecture room, where the diners were joined by a large delegation of members from distant points. From 7:30 to 8 o'clock there was an informal reception, affording members an opportunity to renew old acquaintances and swap stories. At 8 o'clock sharp the meeting was called to order by the President, who in a few words drew the attention of the members to the value of the paper about to be presented, and then introduced Mr. Henry C. Crafts, of Pittsfield, Mass., whose paper on "House Maintenance" was enthusiastically received and brought about a long discussion, many prominent gas men and appliance manufacturers' representatives taking active part.

It was most pleasing and encouraging to the board of officers to note the interest the members are taking in the meetings this year. Each meeting shows increased attendance, and through the co-operation of traveling members the good word is passed along, and as a result we expect to add to the membership list the names of many gas men who have previously failed to respond to the call.

The principal speaker announced for the next meeting, which will be at the City Club, on Friday, April 23rd, is Mr. John George Jones, of the Alexander Hamilton Institute of New York, who will deliver an address on "Salesmanship." Mr. Jones is regarded as an authority on this subject, and an extra large attendance is expected.

[Official Notices.]

Pennsylvania Gas Association.

West Chester, Pa., March 17th, 1915.

The Pennsylvania Gas Association, will hold their Annual Meeting in Philadelphia, on April 14th, 15th and 16th. The headquarters will be at the Hotel Adelphia, one of Philadelphia's leading hotels.

A splendid programme has been planned, including these papers by well-known men.

"Gas Lighting in the Home."
"Domestic Uses of Gas."
"Industrial Uses of Gas."
"Water Heating by Gas."

The entertainment features are in the hands of gentlemen whose reputation has been established for something original and interesting.

It is hoped all members and their friends will be on hand, to make the meeting "Better than ever."

Yours very truly, W. O. Lamson, Jr., Secretary.

Iowa District Gas Association.

Des Moines, Ia., March 22, 1915.

The Eleventh Annual Meeting of the Iowa District Gas Association will be held in Clinton, Iowa, May 26, 27, and 28.

The headquarters of the Association will be at the Lafayette Inn. Members are urgently requested to make early reservations. Mr. Thos. Crawford, General Manager, Clinton Gas and Electric Company, is Chairman of the Committee of Arrangements, and will furnish any information desired. Reservations may be made by communicating with the Lafayette Inn.

The following papers will be presented at the meeting:

"How can we Most Profitably Supercede Oil, Coal and Coke with Artificial Gas as Fuel in Industrial Plants?" by E. L. Lambert.
"Industrial Appliances," by W. L. Powers.
"Iceless Refrigeration," by Malcolm F. Ewen.
"Commissions and Financing of Gas Properties," by Andrew Cooke.

A symposium of short papers on:

"How to Spend Money to Make Money in the Gas Business," by H. C. Blackwell, H. B. Maynard, G. W. Clabaugh, G. I. Vincent, E. I. Lambert and W. H. Taylor.

The attention of the members of the Association is called particularly to the list of papers, which embody the most vital subjects before our industry to-day.

In addition, the following Standing Committees will report: Tar, Manufacturing, Distribution, Construction, New Business and Public Relations.

There will be a smoker and Dutch lunch on Wednesday night, a trip to Eagle Point Park, and an open air picnic meeting on Thursday, and a boat trip on the Mississippi river on Friday.

T. B. Genay, Secretary.

(*Continued from page 215.*)

Financing Problems of Public Utilities Companies.

investment. By consulting the Government reports you will find that 95% of all the publicly marketed electrical energy in the country is produced by privately owned companies, and that 99% of all the manufactured gas of commerce is made and sold by such companies. Not more than 3 out of 900 or more electric railways are publicly owned, while the number of municipally operated telephone exchanges is so insignificant that no one has taken the trouble to count them. None can seriously argue that the conditions enumerated came about by accident. They grew from the deliberate policy of a free people, and with full cognizance and approval of at least the ruling majority. The wisdom of this economic policy will be plain to anyone who soberly and equitably compares its results with the experience of public ownership policies in this and other countries.

Failing entirely to survey these subjects understandingly in their broad sweep, and shamefully distorting specific data and incident, the advocates of corporate hostility in many parts of this country have been frequently unjust. There are persons who, disregarding the power of regulation over public utilities posessed by the States, urge the destructinn of legitimately employed property by means of municipal competition, outrageous taxation, the depression of returns on investment to the lowest possible point that can escape the current legal interpretation of confiscation; who believe in obstructing and harassing public utilities at every turn, and who favor reducing such property to "junk value." Can such methods be called American, or fair, or morally defensible? They are precisely the propaganda garnished with monstrous appeals to unfair prejudice, that are given voice to-day in several of our cities (but not, so far as I know, in Minnesota) —cities where the utilities attacked have been among the most potent forces in upbuilding. It is this kind of potential anarchy—happily not common —destructive of property and democracy alike, that makes the financing of public utilities by responsible organizations much more difficult than it aught to be. It sometimes causes utilities in the investment class to pay much more for money than would otherwise be necessary. It is holding back the financing of many new projects of vital importance to national development. The cost of capital is necessarily and automatically reflected in the cost of service. It is a point of concern, therefore, to every citizen. If there is to be a change to a general policy of public instead of private ownership, it should be made without injustice or the breaking of faith with the men whose work and capital have built the utilities. If the majority covet property that does not belong to it, it should acquire possession by honorable purchase at fair value—not by the contemptible process of depreciation and forced sale.

The ownership of American utilities is distributed among hundreds of thousands—perhaps millions—of citizens, most of them persons of modest means; among the banks in which the money of the people is deposited; among insurance companies in which the funds of the people are heavily invested, and in trust funds upon which individuals and philanthropies depend. The American Telephone and Telegraph Company had 59,415 shareholders December 31, 1914; the Twin City Rapid Transit Company of Minneapolis and St. Paul had 3,795 in 1913; the Consumers Power group in Minnesota has 2,750. These figures do not include the bondholders, of whom no records are kept. The banks of the United States, including savings banks, June 30, 1914, held as investments public utilities securities valued at $583,900,000. Precise information as to how much the insurance companies have so invested is not available, but the sum must be large. Legislating value out of public utility securities strikes at the thrifty citizen of limited means, and at the savings of the people. It is no more immoral to depreciate the worth of a man's farm, or to deprive a laborer of part of his earning power, than it is to depreciate unfairly the value of a bond or share of a public utility corporation. In any real conception of justice all people and all property must be equal before the law. Fortunately, the American people are not easily and permanently mislead by vicious economic teachings. They do not ordinarily follow the "public ownership" anarchists in their efforts to tear down what others have built up. Frequently, and particularly of late, the voting public has repudiated these unpatriotic and dishonest propoganda and have upheld the principles of fair play which have made this nation great.

The size and insistence of the demand for new capital in public utilities, to meet the need of the public, is not understood by the average citizen. The annual amount actually raised and invested in this way is startling. It cannot be otherwise if cities and towns, and more and more the agricultural districts, are to be properly served. For example, the production capacity of the electric light and power plants of the country increased more than 300% in the ten years ending with 1912. To secure this new capital through the sale of bonds, stock and, in some cases, notes, it is necessary to appeal to a wide investment market. Local capital is usually inadequate for the demand, and it is necessary to offer securities to investors in many States and sometimes abroad, and to provide securities easily marketable, suitable as collateral for loans, and in other respects of familiar and good repute in financial circles. In other words, the money must be accumulated through many comparatively small transactions involving a large number of investors. In this way capital is transported from communities where it is abundant to places where it is scarce or where surplus capital can be more advantageously employed in other lines of enterprise and local upbuilding. Every dollar of outside capital invested in a public utility leaves free an equal amount that can be put to work in other useful ways.

It is idle to suppose that the securities of utilities operating in small and medium sized cities can meet the conditions demanded standing by themselves, individually. Several utility companies together, however, sponsored by a management of known ability, can do so. By combining credit and operating requirements they may accomplish things in their own and the public's interest that they cannot do independently. These conditions have evolved the modern public utility holding company—a corporation owning or controlling several separate utility properties. The Northern States Power Company, which owns the stock of the Consumers Power Company of Minnesota, is an example of this kind of corporation; and also an example of how it is possible to better results by the concentration of manufacturing, construction and transmission, rendering service over wider areas, and improving the quality and reducing the price of service. The public advantages of conservatively managed utility holding companies are indisputable. They are to these industries what the trunk line railways are in the great transportation systems. They have made possible an unexcelled National telephone service; the construction of great water powers; the rendering of light and power service to many communities, rural districts and mining and industrial fields through transmission net work; the extension of gas plants and the flinging out of electric railways to the suburbs and interurban points. These large business units are no more to be avoided in the proper and useful development of public utilities than was the development of the great steam turbines, or the increased efficiency of the incandescent lamp that gives the customer six times as much light for the same amount of current as he was able to obtain not more than 6 years ago.

Co-incident with the holding company came into existence the modern form of syndicated, or specialized management, which has raised the operation of public utilities from crude experimentation to an industrial science. Public utility holding companies and public utility managing organizations are not identical, and should not be confused. The management organization exists for the purpose of rendering definite and specialized services that they themselves are unable to provide or cannot procure at prices that they could afford to pay. It furnishes the highest grade of engineering skill, financial sponsorship, commercial direction, legal ability and advice in the conduct of the business. By concentrating these demands from a number of utilities it is possible to assemble and maintain central organizations of specialists and technical experts who can render the necessary service as required. The need of such managing organizations has been proven over and over again by the successful results that have followed their efforts. Backed by such an organization the resident manager—who could not possibly combine the various technical essentials necessary to the scientific conduct of his property—is left free to devote himself to supervision of service; toward studying the needs of the public and best ways of meeting them, and to participate actively in municipal welfare and upbuilding. It is due to the holding company and the centralized management organization, that our public utilities have been able te find the money and build up these industries abreast of and in advance of the times; to improve service and vastly widen its scope; to seize upon and utilize every new mechanical development as it appeared; to steadily reduce rates in the face of higher wages, higher costs for materials and multiplied taxes; and to do these under the fire of visionaries and malcontents—onslaughts which, if successful, would strike down constructive progress and be subversive of the public good.

One of the problems at present confronting electrical companies is that of rural service. They are giving it their best attention, and striving to respond to the increasing demands from farmers,

villages and isolated industries for modern 24-hour light and power service. It is only by combining the electrical demands of the cities and towns with those of the country that the agricultural communities can be served. If the cities wish this problem satisfactorily solved and their trade territories benefitted, they must do their part in encouraging the transmission companies to secure capital for the necessary investment. On the other hand, the representatives of the country districts in legislative and civic bodies should not overlook the fact that only prosperous companies operating in the cities can secure the capital to push lines into the rural sections. The country legislators will find upon investigation that they are properly interested in the welfare of the public utilities now operating chiefly in the cities.

This has been a difficult paper to prepare, for there has been a constant temptation at every paragraph to further elaborate and explain the particular matter under review. It has been hard to keep within bounds, because there is so much one feels like sayings when he has the opportunity, in refutation of the misconception of our business and its conduct continually dinned into the public's ears. During the last nine years I have been on the firing line doing whatever lay within my ability to oppose all kinds of destructive movements against utility companies. Some of the methods and practices we have to face are utterly unscrupulous, and out of all proportion to whatever abuses there may be in corporate management, present or past. I feel that these untruthful diatribes and conspiracies should be denounced in strong and unmistakable language, and their effect upon public utility financing, progress, rates and service clearly stated. Every man connected with the industries in which we are engaged should use the best that is in him in defense of what he knows is right, and in appeal to the moral sense of his fellow citizens. Not until both the conscience and reason of thinking people are aroused against injustice to utility corporations will public utility financing cease to be a formidable problem.

Coal Gas Candle Power.

[From the paper by L. J. WILLIEN, read before New England Association of Gas Engineers.]

The candle power of coal gas made with horizontal, inclined or vertical retorts, which are charged intermittently, constantly varies. After charging, the candle power will increase very rapidly to a maximum, and then gradually drop to a minimum just before drawing. This variation is shown in the following table which is the result of a series of readings taken every 20 minutes for a period 5 hours:

Time, A.M.	Candle Power.
7:20	14.0
:40	15.2
8:00	16.0
:20	16.8
:40	16.8
9:00	15.9
:20	15.8
:40	12.9
10:00	12.5
:20	14.3
:40	18.5
11:00	19.8
:20	19.6
:40	17.7
12:00	16.6
Average	16.1

In the above tests the gas was burned in a new F. Argand burner with a 7-inch chimney $1\frac{3}{4}$-inch diameter. The gas was made in inclined retorts; length of carbonizing period 4 hours and 50 minutes; half of the retorts charged every 2 hours and 25 minutes. If the retorts are charged regularly at definite times, the gas will reach its maximum and minimum points at practically the same time every day.

It can be seen from the above that it is possible to get most any candle power desired by taking readings at the proper time. The ideal way of getting a fair average of the candle power would be to take readings at least every half hour throughout the 24 hours, but to do this would necessitate employing two or three men for no other purpose but to take candle power readings. In a large company where a laboratory is maintained, with a corps of chemists, it is possible to do that; but in the average company only one chemist is employed, whose duties are to make other routine tests besides taking candle power, and usually three readings a day are taken.

With the average gas company the "Periodic Method" of taking candle power readings on the coal gas is a very good one, which means taking periodic readings three times a day; one when the candle power is at its maximum, one when it is at its minimum and one when it is at an average. A series of tests made at Springfield and Malden in 1909 covering a period of 2 months, by determining the candle power by the periodic method and by taking 5 hour cycle reading twice a week, showed that the average of the two methods checked within 0.2 of a candle.

The periodic readings taken daily are better than taking a cycle reading twice a week, in that readings are obtained on the gas made every day. Then, too, taking cycle readings is rather hard on one's eyes, but it is advisable to take one cycle reading a month to check the periodic readings.

The periodic method with three readings daily, and checking with a cycle reading once a month, was used in the Malden, Springfield and Fitchburg plants for 2 years. It was not satisfactory because it did not tell anything about the candle power of the coal gas made during the night. So in the summer of 1911 a series of experiments were started on collecting a sample in a small holder, and then determining its candle power.

First, a 6-foot meter prover was connected to the coal gas line running to the photometer and a series of 10 tests made allowing the holder to fill up very slowly. In the meantime a candle power reading was taken every 15 minutes. When the prover was full the gas collected was run through the photometer and several readings taken to see if the gas stratified.

The results of tests were as follows:

Average candle power.	Calculated candle power.	Gas in holder, candle power.
15.6	15.3	15.0
14.7	14.7	14.7
14.5	14.6	14.3
16.2	16.3	15.7
16.0	16.0	16.0
14.9	14.9	14.4
15.6	15.6	15.5
16.3	16.3	15.9
15.8	15.8	15.2
16.2	16.2	15.9
15.6	15.6	15.2

The average candle power is the average of the cycle readings. The calculated candle power was obtained by taking the station meter reading every 15 minutes and determining what per cent the gas passed for each 15 minutes is of the total gas that passed the station meter while the prover was filling, then multiply that percentage by the candle power of the gas for that period; by doing that for each 15 minutes period, the sum of the products obtained will be the calculated or theoretical candle power of the gas made during the time the prover was filling.

After the above tests a holder 3 feet in diameter and 3 feet high was made and connected up in a similar way. Another series of tests were made in the following way:

The flow of gas into the holder was regulated so that the holder would fill up between 5 P.M. and 8 A.M. The gas collected during the night was tested the first thing in the morning. The gas remaining in the holder after the test was run out through a blow-off, the holder allowed to fill up during the day and tested about 5 P.M. The time required for taking the two candle power readings and blowing the gas out of the holder was less than an hour, so the two tests would represent the gas made during 23 hours out of the 24. The regular tests were made on the gas by taking readings at a high, low and medium point.

At first the candle power of the gas collected in the holder was much lower than the regular tests showed; this probably due to the water in the holder robbing the gas of some of its illuminating constituents. After allowing gas to stand in the holder for two weeks the water became saturated with gas and no further difficulty was experienced.

A series of tests were made using the holder and Perodic Method covering a period of two months, the average of which showed the gas collected in the holder during the day to be 15.4 candle power. That collected during the night was 15.2 candle power, giving the average for both of 15.3. The average of the periodic readings was 15.3 candle power.

The results show that the Holder Method checks very well with the Perodic Method, and has the advantage of making it possible to determine the quality of the gas made during the night shift, and gives a reading that will be more representative of the gas made throughout the whole 24 hours than the Periodic Method.

The Holder Method has been the standard method of taking the coal gas candle power at Malden, Springfield and Fitchburg, for the past three years. It is checked up from time to time by taking a cycle reading and comparing the average with the gas collected in the holder; about 50 of these check tests have been made in the past three years and they have always checked up very well. The greatest difference observed so far between the gas in the holder and the average of the cycle reading has been 0.3 candle, and that difference has been only once.

The following table giving the results of the check tests made at Malden during 1912 will show how close the two check.

Month.	Cycle reading.	Holder reading.
January	14.3	14.6
February	15.4	15.6
March	16.2	16.3
April	15.5	15.4
May	15.1	15.3
June	15.7	15.7
July	15.5	15.3
August	16.2	16.1
September	15.0	15.0
October	15.3	15.1
November	15.3	15.3
December	15.4	15.3
Average	15.4	15.4

German Influence in Russian Gas Business.

From an Occasional Correspondent.

PETROGRAD, February 27th, 1915.

Of all the developments that have resulted from the state of war in which Russia finds herself, the most striking, apart from the military events, is undoubtedly the revelation to the world of the almost incredible position that Germany had acquired in the economic life of the country, including the financial side. A series of articles have recently appeared in the Russian press exposing how completely even great interests in the public life of the country were held in the grasp of German financiers and industrialists. The position these influences have acquired in the country is not of recent date. But many years back it can be shown that indirectly, through the agency of a number of powerful financial combinations established in Belgium, Germany has been able to lay hands on many of the most cherished municipal interests in Russia, whilst all the time the part was so skilfully played that the world over, and in Russia itself, the impression has prevailed without question that these interests were held by Belgian concerns, and it was always a puzzle how a comparatively weak country like Belgium should have so courageously and effectively got hold of so many and such important Russian public works. The "Government Gazette," from which this information is taken, shows that this control, which was most manifest in tramway and light railway concerns, as in other directions, was quite as complete, though on a smaller scale, in respect to the gas works, of which there are, however, relatively few in Russia. As a matter of fact, where there are gas works, they are practically under German control, and where there are not gas works it is the Germans that hold the concession for their construction and exploitation when a suitable time arrives for giving effect to such concessions. The statement is to the effect that Germans hold concessions for gas lighting in the principal Russian towns, and that these concessions cover many years. At the moment the Germans have gas works in a number of towns enumerated as follows: Kalics, Petrokoff, Tomasheff, Libau, Kronstadt, Wilna, Kazan, Warsaw and Petrograd. The following is a list given of German companies operating gas works in Russia and showing their capitals:

	Opened.	Capital.	Branches.
German United Gas Cos., of Augsburg	1885	$360,000	Tomasheff Kalica and Petrokoff.
Haarden Gas Works Co.	1891	$375,000	Libau.
Gas and Electricity Cos., of Kazan	1900	$655,000	Kazan.
Gas and Electricity Applications Co	1910	not issued.	Kronstadt and Wilna.
German Continental	1889	$6,120,000	Gas and Chemical Works in Warsaw.

The German Continental Gas Company is thus shown to be the financial concern that has the largest gas interest in Russia, but besides controlling gas interests it has chemical works in the country which produce gas works derivations, such as salammoniac spirit, anhydrous ammonia, naphthaline, benzol, carbolic acid, creolin, lisol, carbolineum, etc. German interests in respect to gas are all powerful in Warsaw, and it may be noted, too, that for a number of years past the German gas works in the country have been remarkable good paying concerns. The German gas lighting companies which have been very successful lately, show the following results in dividends published in 1911 and 1912:

	1911	1912.
Kazan	6%	8%
Augsburg	9	9
Haarden	10½	10
Continental	11	11
Gas and Electricity	..	..

It appears that the German Continental Gas Company's shares are quoted in Berlin, and that this company is reponsible for a number of successful flotations of gas concerns in Russia, and there is no doubt that in many directions not named above the German financial syndicate holds the strings of projected enterprizes where gas will be prominently featured.

British Thermal Unit Losses on Medium Pressure Line.

[Written by W. O. BREWER, for New England Association of Gas Engineers.]

An increasing demand for a heat standard in place of, or in addition to, the present light standard, has led to much investigation to determine the advisability of such a change. On the part of the consumer the question is whether as good service will be obtained, and whether it will eventually result in lower prices; while the manufacturer desires to learn the relative difficulties and the costs of manufacture and distribution under the two standards. The Meriden Gas Light Company has maintained a calorimeter in its laboratory for the past 2 years, and healing values of the carburetted water gas and mixed gas have been determined daily at least, as well as the candle power. In the manufacture, apparently no more difficulty need be met with in the use of a heat standard than in the use of a light standard; as to the effect of distribution on the heating value of our gas, no data had been obtained.

In order to learn the loss due to compression and transmission, the gas which underwent the most severe conditions was taken. A medium pressure 6-inch line supplies the village of Southington, 8 miles from Meriden, and branching from this is a 6-inch line which supplies Cheshire. During November last, at the time of the tests, the consumption of this district was between 55,000 and 65,000 cubic feet daily. The gas was subjected to a pressure of from 7 to 100 inches water, depending on the consumption. The line to Southington crosses five short bridges but is well protected from low temperatures. A calorimetric testing station was located at the gas office in Southington, and in Meriden the testing was done in the laboratory at the works, about 10 feet from the holder from which the gas was drawn to send over the line.

The outline of tests included a determination of candle power, B. T. U., dew point, benzol and illuminants, at Meriden, and at Southington a B. T. U., dew point, and the collection of samples of gas for analysis at Meriden. The chief difficuity was the obtaining of the same sample of gas at both places. Estimation of contents of mains gave 20,000 cubic feet, outside of services. The fact that the main was in the form of a T, and that there was no way to tell how much each branch consumed, made exact calculation impossible. Finally the figures of 17,000 to 20,000 cubic feet was taken to be the amount to be passed through the meter from the time of test at Meridian to time of test at Southington. Thus, tests made in Southington in the middle of the afternoon were on, approximately, the same gas as was tested during the last part of the morning at Meriden. Because of uncertainty as to whether

the samples were of the same gas, the daily results are not strictly comparable, and the average of several tests, covering as many days, seems to best show actual conditions. Not only that, but such gas was subjected to the greatest pressure of the day, due to greatest consumption then and the necessary speeding up of the exhauster.

The following are the results obtained:

Meriden				Southington		
Dew point deg. F.	Candle power.	B.T.U.	Inches water pressure at exhaust outlet.	Dew point deg. F.	B.T.U.	Inches water pressure
53	17.70	588.3	100	50	589.3	45
54	17.40	602.0	100	49	594.3	45
54	17.94	601.8	84	50	606.0	45
55	17.88	621.5	84	48	608.2	50
56	17.91	617.5	84	53	608.3	50
57	18.52	618.2	84	50	614.4	50
52	17.87	615.5	84	52	613.8	50
55	18.28	610.2	84	51	604.7	50
52	18.24	616.5	84	47	619.1	50
55	17.20	614.4	62	52	613.3	35
55	16.84	601.5	62	50	598.0	40
48	17.52	611.2	60	46	620.1	40
50	16.56	597.8	62	44	597.6	45
52	17.30	603.1	60	46	596.4	35
50	17.14	600.6	60	47	596.8	45
48	17.34	612.9	60	41	600.6	45
52.8	17.60	608.3		48.5	605.1	Average

Gas Samples.

Meriden		Southington	
Per cent. benzol	Per cent illuminants.	Per cent benzol.	Per cent. illuminants
1.10	5.65	1.00	6.05
1.20	7.75	0.65	7.70
1.55	7.80	1.00	7.70
1.15	7.65	0.75	6.75
1.30	8.05	1.00	8.20
1.30	7.65	1.00	7.25
1.25	7 50	1.10	7.30
1.25	7.75	1.20	8.40
1.25	6.10	1.20	6.50
1.30	7.40	1.25	6.45
1.55	7.75	1.05	7.35
1.29	7.37	1.02	7.24 average

Gas analysis were not obtained every day, and are placed separately, because it was deemed they were not necessarily on the same gas as the other tests, but indicated, nevertheless, a good average of relative changes in benzol and illuminants due to compression and transmission.

Note that the loss in B. T. U.'s amounts to 3.2 B. T. U.'s, or 0.52%, while the benzol loss is 0.27% and that of illuminants 0.3%. It is regretted that candle power determinations could not be made at Southington, as undoubtedly the light loss would have been much greater than the heat loss.

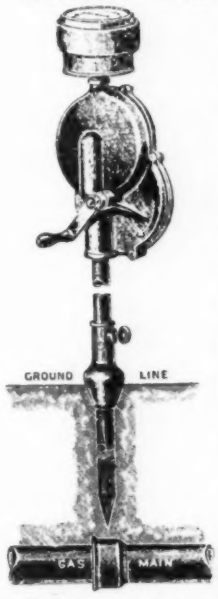
The calorimeters used were a Sargent, loaned us by the New Haven Gas Light Company, and our own, a late type of Hinman-Junkers. Preliminary to the tests the meters, which had heen standardized by a $\frac{1}{2}$ cubic foot bottle, were checked against each other and found to indicate the same. Average tests on the same gas showed the Hinman-Junkers gave 0.3% higher results. The water, which was furnished by overhead tanks, and was at nearly room temperature, was weighed. The calorimeter thermometers were standardized.

Candle powers were read on an 80-inch closed bar photometer with a two-candle standard, in a Sugg *D* low-cone burner. Comparisons of this burner with a 7-foot Bray's Special, and a Bray's 8-foot economizer slipped over a 3-foot regulator, on the same grade of gas as used in the tests, showed the 7-foot burner as 1,000, the 8-foot as 1.044, and the Sugg *D* as 1.122— or, for a 17.60 candle power by the Sugg *D*, as in the average of the tests, the 8-foot would give 16.38 candle power, and the 7-foot 15.69 candle power.

In analyzing the gas, a water jacketed Hempel burette, connected permanently to the pipettes by a "battery of stop cocks" (branch tube) was used. The benzol absorption was made over mercury in a single pipette full of rubber tubes stretched over glass rods. After taking out the carbon dioxide and oxygen, the illuminants were absorbed by a saturated solution of bromine water. The Southington samples were taken in regular glass sampling tubes and transferred to the Hempel apparatus for analysis.

New Methods and Appliances.

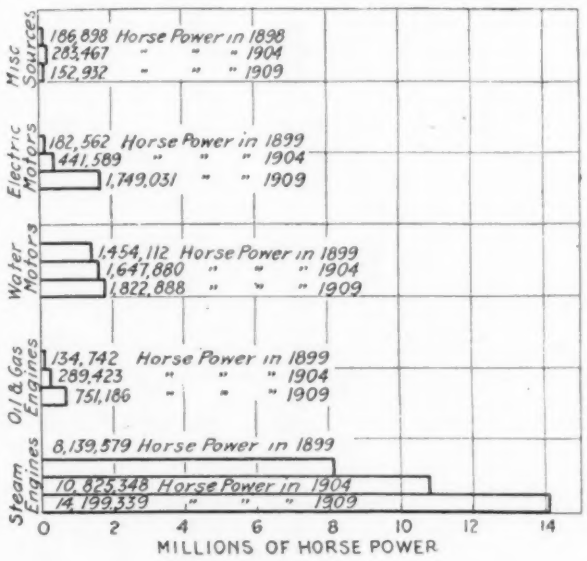
METHOD OF LOCATING LEAKS.—This is an English apparatus for locating leaks in mains. It consists of a small fan with an inlet pipe adapted to be inserted into a hole over the main to be tested. On the outlet of the fan there can be placed any type of leakage indicator. To test for a leak, the inlet tube is inserted in a hole made with an ordinary leak bar, a plug ring dropped down the tube to seal the mouth of the hole, and the handle of the fan given a few turns, drawing air from around the main and discharging it upon the porous diaphragm of the indicator. There is a general belief that whenever a hole is made in the surface of a road a feeble current of air rises out of it; but that such belief is erroneous is obvious when one considers that the forces at work are due to local differences in temperature, level and porosity of the soil, etc. It thus frequently occurs that when a hole is made in the surface any current of air is into, and not out, of it. This explains why small leaks are often unobserved when an indicator is simply placed over a hole. With this apparatus, however, an underground current is set up, and made to pass over the indicator, so that the slightest trace of gas is registered.



INSULATION OF OVEN WALLS.—In some experiments to determine the loss of heat through the walls of an electric oven made in the engineering department at Harvard University, they tested single walls of asbestos board, double walls with simple air space between, with air space divided into cells, and space filled with "metallic wool."

The double wall with air space gave 60% increased resistance to heat passage; horizontal strips dividing the air space into cells gave no further improvement; filling the space with "metallic wool" increased the insulation by 90%.

PRIME MOVERS IN AMERICA.—This table, compiled from U. S. Government publications, shows the immense preponderance of



steam prime movers in manufacturing plants over all other sources of power.

A STAINLEESS NON-RUSTING STEEL.—A new steel claimed to be non-rusting and untarnishable, called Tirth's stainless steel, has been introduced by an English firm. The new metal is especially adapted for table cutlery and requires only ordinary washing to clean it. It is said to retain a keen edge resembling that of double-shear steel, also that the properties are inherent and not due to any treatment. The price is reported to be 26 cents per pound or double that of the usual steel for the same purpose. It also costs more to work up.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

THOMAS H. HINTZE, Superintendent of the Providence (R. I.) Gas Company, addressed a meeting of the Providence Association of Mechanical Engineers in the Engineering Building, Brown University, on "The Manufacture of Illuminating Gas." The lecture was illustrated with a series of slides. After telling of the development of the uses for gas, Mr. Hintze gave many interesting facts connected with the early manufacture of gas in Providence. In 1850 gas in that city cost the consumer $3 per 1,000 cubic feet, now the same quantity sells for 84 cents. The plants of the Providence Gas Company were said to consume from 280 to 300 tons of coal per day to supply gas for the city, which demanded about 7,000,000 cubic feet in winter down to 5,000,000 in the summer months. Many questions were asked concerning various methods of making gas, and certain practices which gas companis were supposed to use, one that of forcing air into the gas mains. Mr. Hintze admitted that gas companies had been accused of every crime under the sun.

THE Wilmington (Del.) Gas Company will extend its service beyond the town of New Castle into Dobbinsville. The Levy Court has resolved, that permission be granted the Wilmington Gas Company, a corporation of the State of Delaware, to construct, lay and operate gas mains with the necessary pipes, manholes and fixtures along and under certain public roads, known as the River Road, south of the town of New Castle, in New Castle hundred, beginning at the city limits of the city of New Castle on the south and extending south along and under said roads to a point where said road bisects the lighthouse road and thence east on the north side of said lighthouse road to the Bethlehem steel plant on the Delaware river.

THE Miami (Fla.) Gas Company has secured from the City Council permits to erect a gas holder and an oil tank. Two hundred thousand dollars will be expended by the company in improvements and extensions this year. The plant is now running to capacity, but is barely able to meet the demand, so fast is the city growing.

THE Welfare Club of the Meriden (Conn.) Lighting Companies starting with nearly 100 members, employees of the Meriden Gas Light Company and the Meriden Electric Light Company was formally organized March 23d. General Manager Charles A. Learned presided and called for a report of Chairman Edward Everard of the nominating committee that was appointed at a preliminary meeting. The following officers were unanimously elected: President, Burton Sala; Vice-President, Charles Zimmer; Secretary, Clifford Greenhouse; Treasurer, Walter Carey; Executive Committee, Charles A. Learned, Burton Sala, Charles Zimmer, Clifford Greenhouse, E. A. Frazier, Matthew Jones, C. J. Hunt, William Dunlap and W. O. Brewer. Following the election each of the officers were called on for some remarks, and then C. V. Dimock of the New Haven Gas Light Company, told of his trip to Nicaragua. Refreshments were served under the direction of William Ferguson. The regular meetings of the organization will be on the third Tuesday of each month excepting June, July and August.

THE ninth annual convention of the Illuminating Engineering Society will be held at the New Willard Hotel, Washington, D. C., September 20–23 inslusive. Mr. E. S. Marlow of the Potomac Electric Power Company, Washington, D. C., is chairman of the convention committee. The schedule of sessions, papers, etc., will be announced later.

BECAUSE the franchise granted the Citizens Gas and Electric Company, Cedar Falls, Ia., specified that gas furnished consumers in Cedar Falls should be "of a candle power and quality equal to that used by and furnished any city in Iowa," that city has demanded of the company that it live up to its agreement, and names Des Moines gas as the standard. The demand, which is couched in forceful terms, was the result of a comparison of Cedar Falls gas with Des Moines gas, which showed the former to be about 10% poorer in quality than the Des Moines gas, "which," says a Cedar Falls correspondent, "is believed to be the best in the State."

THE Salem (Mass.) Gas Light Company has an ornamental cluster of lights on Washington street opposite the Kinsman block to demonstrate what they can do in the way of street lighting. The present electric street lighting is considered about as poor as the city ever had.

AT its annual meeting, the Tacoma (Wash.) Gas Company Educational Club elected officers as follows: E. Johnson, President; J. J. Pendergast, Vice-President; H. H. Whiteside, Treasurer; F. Brown, Secretary; T. Burke, Sergeant-at-Arms; C. Goble, Assistant Sergeant-at-Arms. The members of the Executive Committee are as follows: J. E. Nuny, William Dayton, C. Goble, R. Lewes, R. Moon.

THE Hartford (Conn.) Gas Light Company and the Springfield (Mass.) Gas Company, jointly, have under consideration a project for uniting the pipe lines of the two companies so that, in case of need, gas could be supplied to Springfield or from there. The Hartford company now pipes gas 20 miles to Thomsonville, and the Springfield company comes down within a mile of the lines of the Northern Connecticut Gas and Lighting Company, to which the Hartfort Company supplies gas. The plan is for the Northern Connecticut Company to extend its lines a mile to State line and join the pipe line of the Springfield company. The consolidation of the Hartford and Springfield companies is said to be possible, and the serving of the somewhat thickly populated section along the Connecticut River between the two cities by the consolidated company.

THE Light and Power Company, which was granted a franchise to construct a gas plant in Brainerd, S. D., and which was stopped by the Mayor, appealed to the State Supreme Court to decide the points of law involved. The opinion sustains the gas company on every point. "The gas ordinance was duly enacted by the council and formally presented to Mayor Henning for his approval or disapproval. Subsequently, on the same day, the Mayor requested the clerk to withdraw such presentation and to make a redelivery thereof to the Mayor on the next following day. This the clerk agreed to and he 'took back' the ordinance and caused a redelivery thereof to the Mayor on the following day." It is said that the time within which the Mayor might veto the ordinance began to run on the first presentation, and since such presentation was in fact made, the effect could not be destroyed by an agreement to make another presentation later. The gas plant will be built.

EATON, Cal., may soon have a gas company if the plans of H. E. Gebhardt and Chris Christianson materialize. These men are at the head of a company that is being organized for the purpose of building a gas plant. They are endeavoring to sell $20,000 worth of stock to local people, and if successful in their efforts they will apply to the town for a franchise.

THE Inspector of Buildings of Providence, R. I., has issued a permit to the Providence Gas Company for the erection of its new gas holder on Pettey's avenue in the Olneyville district. The structure will be 136 feet 9 inches in height when inflated, and will have a diameter at its base of 177 feet 6 inches. The Bartlett, Hayward Company of Baltimore are the builders.

HEADED by the Q. O. R. Brass Band, the Consumers' Gas Rifle Club, 250 strong, marched from the armories to Queen's Park, where they were reviewed by A. W. Austin, president of the company. When the battalion arrived at the park it was formed in a square, directly in front of the parliament buildings, and addressed by Mr. Austin, who complimented the men on their magnificent turnout and general good appearance. Manager Hewitt delivered a patriotic address on the objects of the club, and eulogized the members who had already enlisted for active service.

AT a meeting of the stockholders of the Grand Island (Neb.) Gas Company a reduction in the rates was decided upon, which will effect all consumers of gas. All gas, whether for fuel or illumination, will be put on the old fuel rate. In addition to this a sliding scale rate will be inaugurated for users of from 10,000 up to 50,000 cubic feet. The lowest price for 1,000 cubic feet will be about $1.35 where heretofore it was $1.50.

PLYMOUTH, MASS., is to have a reduction in the gas rate. After August 1 the price will be $1.70.

H. S. WILLIAMS, Manager at Plymouth, Pa., for the Luzerne County Gas Company, has been succeeded by A. J. Llewellen, formally general superintendent of that company.

MR. A. F. VAN DEINSE, manager of the Albuquerque (N. M.) Gas, Electric Light and Power Company, will become head of the Springfield, Mo., plant of the Federal Light and Traction Company. He will be succeeded by S. P. Southard, now at Las Vegas.

PLANS to enable citizens of moderate means to get gas services installed in their homes on the installment basis were presented to the city commissioners of Duluth, Minn., by D. A. Reed, manager of the water and light department. He pointed out that many homes have water service but not gas, owing to the fact that laying of water mains in some streets preceeded the extension of gas mains. He proposes that the city authorize the water and light department to put in gas services and accept payment in 10 annual installments in cases where citizens are unable to stand the extension charges.

ABERDEEN, S. D., is promised a fight in the gas rates by the Aberdeen Light and Power Company, who circulated petitions asking for a franchise to manufacture and sell gas at less rates than that now charged by the Aberdeen Gas Company. The new company promises to sell gas at $1.50 per 1,000 cubic feet for quantities under 5,000 cubic feet; at $1.45 for that between 5,000 and 10,000, and $1.40 for all over 10,000 cubic feet per month. The present rate charged by the Aberdeen Gas Company is $1.85 per 1,000 cubic feet for the first 5,000 feet, the prices sliding to $1.55 per 1,000 for large amounts.

A REDUCTION in the price of gas in Boston, Mass., is favored by the Legislative committee on public lighting. The committee plans to recommend a bill for a 10-year extension of the present sliding scale gas law for Boston and to provide that the maximum price shall be 75 cents instead of 80 cents per 1,000 cubic feet as at present.

THE Cedar Rapids (Ia,) Gas and Electric store has secured a lease for a term of years on the newly remodeled store room in the Globe Hotel Building. Harry Skellenger, formerly Industrial Manager of the Cedar Rapids Gas Company, will have the active management of the business. The new firm will carry a full line of gas and electrical appliances.

BY a bill now before the Connecticut Legislature Waterbury will be given the opportunity to establish its own electric light and gas plant. There is a feeling throughout the corridors of the legislature that the judiciary committee will report favorably amending the general statues so the electric light and power monopoly of the state may be broken up. It is understood the three bills for charters will not be pressed, as under the proposed bill they could secure charters without opposition. The bill will meet with great opposition on account of the effect it would have on established lighting and power plants. At present the law is that if the city of Waterbury, for instance, wishes to own a lighting plant it must purchase both the Gas Light Company and the Electric Light Company.

BENJAMIN S. WALTERS, vice-president of the Northern Indiana Gas and Electric Company and general manager of the company's South Bend plant and organization, has been designated by the directors of the company to go to Hammond, Ind., and take charge of its electric and gas properties. He will be succeeded at South Bend by C. N. Chubb, of Michigan City, Ind., manager of the company's Michigan City division.

GENERAL MANAGER F. H. HILL, of the Elmira (N. Y:) Water, Light and Railroad Company, says it is probable that gas will be installed in West Elmira during the coming year. Residents of that section petitioned for the gas last year, but nothing has been done in the matter.

THE population of New Jersey and of East Orange and of the official family of the N. C. G. A. was increased by two (both girls) all within a week. The proud fathers are Will W. Barnes and Louis Stotz, Vice-President and Secretary, respectively.

ANNOUNCEMENT is made of the reorganization of the Kennebec Gas & Fuel Company, which holds franchises for gas in Waterville (Me.) Fairfield, Winslow, Oakland, Skowhegan, Vassalboro and Benton, originally incorporated by Kuemmerle & Company, of Philadelphia. The new officers are: W. Kirkpatrick Brice, president; George E. Brown, secretary and treasurer, both of New York. The directors: W. K. Brice, Albert B. Kerr, New York; John F. Braun, John G. Lowry, Philadelphia, L. L. Cadwallader, Waterville, resident director and manager.

UTILITIES COMMISSION NEWS.

SEATTLE'S MINIMUM RATE.—Testimony relative to the minimum gas rate fixed by the Washington Public Service Commission was heard at a special meeting in the Seattle Chamber of Commerce. By a recent decision the commission reduced the minimum from 50 to 25 cents, and representatives of the Seattle Lighting Company presented testimony seeking a return to the former minimum. After the hearing, Chairman C. A. Reynolds announced that the matter would be taken under advisement and that briefs would be filed by both sides.

INDIANA TEST SUIT DISMISSED.—The injunction suit brought by the Evansville Public Service Company against the Public Service Commission of Indiana for the purpose of preventing the commission enforcing its orders relative to gas rates in that city, has been dismissed in the Federal Court.

The dismissal of the suit followed an agreement reached by the company and the city of Evansville, which was approved by the commission, which set aside its former order. The suit brought by the company asked an injunction against the commission and also asked the Federal Court to pass on the validity of the public utility law.

NEW YORK ELECTRIC RATE REDUCTION ACCEPTED.—The New York Edison Company has announced that it will accept the order of the New York Public Service Commission, First District, reducing the maximum rate from 10 cents per kw.-hr. to 8 cents without lamp renewals. The company states that it will reduce the present statutory maximum rate of 10 cents to a maximum rate of 8 cents per kw.-hr., without lamp renewals, for electric energy for lighting and motor service.

"Consumers desiring to avail themselves of the lamp-renewal facilities of the company may continue to obtain that service at a charge of ½ cent per kw.-hr. for present standing lamps, or they may obtain these lamps from the company at the lowest wholesale prices." The order of the Commission provides that on and after May 1, 1915, and for a period of three years thereafter, the maximum price to be charged by the company for electric service furnished by it in the city of New York, exclusive of the installations and renewals of electric lamps, shall be 8 cents per kw-hr., but this order shall not apply to that portion of the borough of the Bronx known as the old town of Kingsbridge, nor to that portion, if any, of the borough of the Bronx lying east of the Bronx River, in which the company has the right or franchise to supply electric energy.

SALINAS' RATE UPHELD.—The California Railroad Commission has decided that the rates charged for gas by the Coast Valley Gas and Electric Company in Salinas City are neither excessive nor unreasonable, and therefore dismissed the complaint filed by the municipality.

NO COMMISSION FOR UTAH.—The Utah State Senate killed Senator Evans' bill providing for the creation of a public utilities commission for the State of Utah, after the advocates and opponents of the measure had thoroughly discussed it on the Senate floor. The opponents to the measure were taking the position that no condition existed in the State which made such a commission necessary.

COL. HAYWOOD ON NEW YORK COMMISSION.—The New York Senate has confirmed the appointment of Wm. Haywood to succeed Milo R. Maltbie on the First District Commission, Mr. Maltbie's term having expired. The confirming of Mr. Haywood was accomplished by a vote 28 to 15, but with considerable direct criticism of both the Governor and his appointee. The latter was counsel for the Legislative committee that was appointed to find grounds for removing the present commissioners, and was campaign manager for Mr. Whitman in the last election.

PROBABLE REDUCTION OF WASHINGTON RATES.—The reply of the Public Utilities Commission of the District of Columbia to a letter from a Citizens' Association indicates that there may be a reduction in price resulting from the recent adoption of a calorific standard. "Since most of the gas consumed in large cities is used for heating purposes, the quality of gas should be fixed by a heating standard," says the commission. "A gas that has sufficient heating qualities is relatively less expensive to manufacture. It is therefore in the interest of economy that the illuminating standard be replaced by the heating standard. The economy of using less expensive gas should eventually be felt by the consumer, since the law provides that the rates for gas used in the District of Columbia shall be fixed by the Public Utilities Commission, and those rates will depend directly on the cost of the manufacture of gas."

Financial Notes.

THE preliminary report of the PACIFIC GAS AND ELECTRIC COMPANY for the year ending December 31, 1914, shows gross income increased from $11,342,140 in 1907 to $17,220,504 in 1914. During the year the company made a net addition of 29,321 customers, making the total number served 378,705. During the seven years the average yearly gain in customers has been 28,000. It is estimated that additional customers on the books at the beginning of the current year will produce at least $1,000,000 increase in gross revenue. A substantial addition to the revenue is also assured from the exclusive contract for supplying the Panama-Pacific International Exposition with gas and electrical energy. During 1914 the company expended $2,734,000 for new construction. The balance sheet will show current assets of $8,190,659 and current liabilities of $5,056,083. Since January 1, 1915, the company has paid all of its floating debt, amounting to about $1,400,000, and also called for redemption on March 25, 1915, $1,000,000 of its outstanding one-year gold notes, leaving but $3,000,000 of the latter outstanding as compared with $7,000,000 outstanding a year ago. It is anticipated that the remainder of these notes will be redeemed by July 1, 1915, relieving the income account of the heavy charge for note interest and discount. The statement of earnings follows:

	1914.	1913.
Gross operating revenue	$16,912,688	$15,896,006
Deduct maintenance, operating expenses, taxes, etc.	8,913,922	9,331,207
Net earnings from operating	$7,998,766	$6,537,799
Add profit on merchandise sales, etc.	307,816	333,331
Total net income	$8,306,582	$6,871,130
Bond interest	3,890,341	3,783,197
Balance	$4,416,241	$3,087,933
Interest on one year notes and floating debt (temporary)	301,060	118,847
Balance	$4,115,181	$2,969,086
Bond discount and expense	147,715	147,491
Balance	$3,967,466	$2,821,595
Discount and expense on one year notes (temporary)	321,800	98,551
Balance	$3,645,666	$2,723,044
Deduct dividends:		
First preferred stock	14,984	.....
Second preferred stock	600,000	600,000
Common stock	.....	398,848
Balance	$3,030,682	$1,724,196
Less Reserve:		
For revenue involved in pending rate litigation	554,362	261,734
For depreciation	1,000,000	1,462,462
Balance to corporate surplus	$1,476,320	.....

EARNINGS of the WISCONSIN-MINNESOTA LIGHT AND POWER COMPANY, La Crosse, Wis., a subsidiary of the American Public Utilities Company, Grand Rapids, Mich., for the year ending Dec. 31, 1914, were as follows:

Gross earnings	$1,033,414
Operating expenses and taxes	521,760
Net earnings	$511.654
Bond and other interest	232,021
Dividends	55,213
Balance	$224,420

SECURITIES of the ATLANTIC GAS AND ELECTRIC COMPANY of Connecticut of the par value of about $8,000,000, sold at auction in pursuance of an order of the Federal District Court, brought $283,387.64. It is stated the purchasers were stockholders of the company.

THE subsidiary companies of the MASSACHUSETTS GAS report for February $249,869 earned for dividends, as against $248,975 in February, 1914. For the 8 months to February 28 the companies report $1,813,711 earned for dividends, as against $1,791,784 a year ago. During February the gas companies showed an increase of $4,004, while the coal companies reported a decrease of $3,110. For 8 months the gas companies increased their net earnings $139,117, while the coal companies decreased $117,190.

THE report of the WELSBACH COMPANY for the year ended Dec. 31, 1914, shows a decrease in gross profit of $50,000 and a surplus of $95,346, which compares with $146,834 a year ago.

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